

- 28 -

distance between the said two receiving antennas, and θ is the angle between the said direction vector and a line connecting said two receiving antennas, assuming $d \ll R$, wherein R is the distance between the interrogating transponder and the interrogated transponder.

Abstract

The invention relates to an IFF transponder for ground applications, which comprises: (a) Encoder for forming an interrogating or response sequence of pulses, and conveying the same to a UWB transmitter; (b) A UWB transmitter for getting said interrogating or response sequence of pulses, forming a corresponding interrogating or response signal of a sequence of UWB pulses, and transmitting the same via a UWB transmitting antenna; (c) A plurality of UWB receiving antennas, disposed away one from the other, for receiving either an interrogating signal or a response signal sent by another transponder; (d) A decoder for getting from at least one of said UWB receiving antennas received signals, decoding the same, comparing the decoded signal with a bank of pre-stored signals, and determining whether a received signal is an interrogating or response signal; and (e) A processing unit for, upon receipt of a signal of response to an interrogation signal sent by the present transponder, calculating the location of the responding transponder by: (I) Determining the range R by the time delays between the interrogating and response signals; (II) Determining the direction vector to the responding transponder by evaluating the time differences between arrival of each response pulse to a plurality of receiving antennas; and (III) determining the identity of the responding transponder by checking the received sequence of UWB pulses, assuming that the sequence of each transponder is unique.